

22 September 1989

Space shuttle *Intrepid*, Mission STS-92A

T+5, Five hours after launch

Hour three of unscheduled spacewalk (extravehicular activity)

Cat Riley arched her back and stole a moment to gaze at the bright Pacific racing four hundred miles below her. *Earth looks like a landless water ball from here*, she thought, letting the planet's blue wash over her. Outside in the vacuum of space, Hayes Bartlett struggled with *Intrepid's* balky cargo. He was perched on the end of the space shuttle's robotic arm, which Cat was controlling from the aft cockpit.

Their payload was bigger than a school bus: the *Odysseus* solar probe stacked on its Centaur G rocket. The whole assembly in its launch cradle was stuck halfway up, and the probe could be neither launched nor stowed until it was freed up.

Hayes had been working to get it loose for hours. Seeing him stop to flex his fingers, Cat knew his hands were cramping in the stiff gloves of his space suit. But he wasn't going to complain about it; astronauts rarely mention such matters. Jack Badger, Hayes's partner on this spacewalk, also noticed the pause.

"Hayes," Cat said on the intercom, "would you like a reposition? Your angle to the stuck cradle looks a little awkward from here."

"This jammed bolt is not coming loose without a power tool," Hayes said. "We need to saw it off. Jack needs to give me a hand. He's been napping."

Jack, tethered nearby Hayes in *Intrepid's* payload bay, replied in his best Chuck Yeager drawl, "A poor workman blames his tools. What do you say, Houston?"

“*Intrepid*, Houston,” replied fellow astronaut Liz Trujillo over the radio from the Mission Control Center at the Johnson Space Center. “Payload Ops doesn’t think your toolkit hacksaw can access the bolt as is. But we want you to try anyway.”

Moments later, Hayes said, “Mission control is right. Can’t get the hacksaw behind the bolt head to cut it. The blade needs to come off the handle.”

“We’re with you on that,” Liz answered. “You can use the wire cable you have. It’s the right gauge for you to make a little two-man crosscut saw. You can be Paul Bunyan; Jack can be Babe.”

“Do we get to sing the lumberjack song from Monty Python?” asked Jack as he dug out the wire cutters from the tool kit on his suit.

“Permission denied.” The authoritative voice of *Intrepid*’s commander, Terry Rogers, joined the conversation. He was floating next to Cat in the cockpit, and he was scowling. “This EVA is wasting time,” he said to Cat. “No mission is going to hell on my watch.”

NASA forgot to issue Terry a sense of humor for this mission, thought Cat. But the pressure was building. This was taking too long. Only two orbits remained until too much of the rocket’s liquid hydrogen fuel would have boiled off to launch. *Maybe it will inspire Hayes to fix this mess quicker if I finally promise to go on a date with him after the mission. That would sound great on the open comm channel.* She allowed herself a half smile.

Before anyone else could speak, the locking pliers Hayes had clamped to the rocket cradle popped off like a home run baseball. Cat saw it ricochet off the Centaur rocket body and careen out of sight over the lip of the payload bay.

*Shit. Bad. Leaking rocket? Hole in radiators?* How did that happen? Cat knew the shell of the Centaur’s tank was so thin you could put your finger through it if the tank were unpressurized.

“Pliers overboard,” Hayes said on the communications loop. “The vise grip flew off the cradle. Bounced off the Centaur and went starboard. I don’t see anything spewing from the upper stage case. Permission to check the coolant radiators and payload bay door. And someone check the contract for that tool.”

“Yeah, the arm’s wrist cam caught that little excursion,” Liz said. “Let’s have Cat take you over the side for a look-see. If any coolant is leaking from the radiator panels, stop immediately.”

Dominick Petrocelli, the shuttle’s pilot and fifth crew member, came online with, “Radiator valves and temps still nominal, Houston.” The payload bay doors were lined with coolant radiators that kept the heat-generating parts of the shuttle from getting toasted. Covered with silvery Teflon tape, the two fragile panels on each wing were curved to nestle in the payload bay doors. When lifted away from the doors to dissipate more heat, they gave the shuttle dragonfly’s wings.

*Loss of a coolant loop might abort the mission, but we can’t go anywhere with Odysseus stuck halfway up. We can’t shut the payload bay doors.* This was getting scary. Jack and Hayes extended the robot arm so Cat could move him out of the payload bay. She began to lose direct sight of him, but cameras on the arm joints displayed where Hayes was going.

“Houston, EV1,” Hayes said, using his identifying call sign. “The radiators look intact. The vise grip is stuck on the outside lip of the payload bay door, and it’s an easy grab. Can you see it, Cat?”

“Affirmative. Waiting for the go-ahead to move you closer.” She nudged him a few feet farther toward the right wing while awaiting official permission.

“*Intrepid*, Houston. Cat, you’re go on taking EV1 in for tool retrieval.”

“Roger, Houston,” Cat answered. “EV1, let me know when you’re in position.”

Recovering the pliers was easy by EVA standards. As he reclaimed it, Hayes said, “I’ve got the wayward tool. It didn’t do any damage.” Liz congratulated him. “Cat,” he said, “can you see the wing on the wrist cam? There’s something . . .”

“I’ll take you in for a better view of the wing.”

“Cat, put me just beyond the edge of the payload bay door . . . Closer . . . Stop.”

On the wrist cam screen, Cat stared at a gap where a large chunk of *Intrepid’s* wing was missing from its front edge. She knew everyone, including the engineers in Houston, could see it. The leading edge of the wing looked like a great white space shark had taken a bite out of it.

*Intrepid is doomed. We’re as good as dead.*